TE / Sem VI / EXTC / CBSGS

Digital Time Signal Processing

(3 hours) [Total Marks: 80]

N.B: 1) Question number **1 is compulsory**
2) Solve any **three** questions out of the remaining **five** questions
3) In all four questions to be attempted.
4) **Figures** to the **right** indicate full marks

Q.1(a) A digital filter has following transfer function. Identify the type of filter and justify it (05)

$$H(z) = \frac{1}{1+0.9z^{-1}}$$

(b) Compare FIR and IIR filter. (05)

(c) What is multirate signal processing? Discuss important applications of multirate signal Processing. (05)

(d) $x(n) = 4\partial(n) + 3\partial(n-1) + 2\partial(n-2) + \partial(n-3)$, is a six-point sequence. (05)

(i) Find p (n) if $P(k) = W_N{}^{2k}\, X(K)$ (ii) If $Q(K) = X(K-3)$, find $q(n)$.

Q2) (a) Compute DFT of a sequence x(n) = {1, 2, 2, 3, 1, 2, 2, 3} using **DIF-FFT** algorithm. Compare computational complexity of DIFFFT with DFT for the given signal. (10)

(b) Design FIR filter using frequency sampling technique for the following specifications. (10)

$H_d(e^{j\omega}) = e^{-j3\omega}$ $\quad \omega \leq \frac{\pi}{2}$

$H_d(e^{j\omega}) = 0$ $\quad$ elsewhere

Q3 (a) Derive composite radix DITFFT flow graph for N= 6 = 3 ×2 (10)

(b) Design a digital Butterworth Low pass IIR filter using Impulse invariant technique by taking T =1sec to Satisfy following specifications (10)

$0.707 \leq |H(e^{j\omega})| \leq 1.0$ $\quad 0 \leq \omega \leq 0.3\pi$

$|H(e^{j\omega})| \leq 0.2$ $\quad 0.75\pi \leq \omega \leq \pi$

Q4) (a) The transfer function for discrete time causal system is given by (10)

$$H(z) = \frac{1-z^{-1}}{1-0.2z^{-1}-0.15z^{-2}}$$

i. Draw Direct Form-I and Direct form-II realization structure.

ii. Draw cascade and parallel realization

iii. Find impulse response of the system.

Turn Over

(b) If x(n)= {2,3,4,5}

i. Find DFT of x(n) using DITFFT.

ii. If y(n) = x(n-1). Find DFT of y(n)

iii. m(n) = x(n) +j y(n). Find DFT of m(n) using above results only. (10)

Q (5) (a) x(n)= { 1,2,3,2} and h(n)= { 1,2,3} (10)

i. Find circular convolution between x(n) and y(n) using time domain and frequency domain method.

ii.Find linear convolution between x(n) and h(n).

iii. Compare circular convolution and linear convolution results. Comment on it. (05)

(b) Explain the effect of aliasing in impulse invariant technique. (05)

(c) X(K)={26, -2 + 2j, -2 , -2- 2j} find x(n) using IDIFFT algorithm.

Q (6) (a) Explain the process of decimation with frequency spectrum. (5*4 =20)

(b) Explain in detail the effect of finite world length effects in digital filters.

(c) Explain sub band coding of speech signal.

(d) Impulse response of the FIR filter is h(n) = {1,2,3,2,1}, draw linear phase realization structure.

Q.P. Code: 16205

Q.4 a) $H(z) = \dfrac{1 - z^{-1}}{1 - 0.2z^{-1} - 0.15z^{-2}}$

Q.5 a) i) Read as

i) Find circular convolution between $x(n)$ and $h(n)$ using time domain and frequency domain method

Block No - 309 Hemant Vasaikar <vasaikarhb@spit.ac.in>

Correction in QP Code: 16205

1 message

University of Mumbai <support@muapps.in> Mon, Nov 27, 2017 at 4:32 PM
Reply-To: University of Mumbai <support@muapps.in>
To: vasaikarhb@spit.ac.in

University of Mumbai

EXTC

Correction in Program Code : T3126 - T.E.(ELECTRONICS & ~~TELE-COMMN.~~)(SEM VI) (Rev-2012) (CBSGS) / T0891 - DISTRICT TIME SIGNAL PROCESSING **QP Code: 16205**

Q.5 C) Read as **IDIFFFT** instead of **IDIFFT**

University of Mumbai
https://muapps.in
support@muapps.in
022-26534263 / 022-26534266
Mon-Fri, 10am - 5pm

T.E. (EXTC) Sem. VI CBSS VLSI DESIGN

21/12/2012

Q.P.Code:16056

Time: 3 Hours **Marks: 80**

Please check whether you have got the right question paper.

N.B. 1) Q. No. 1 is compulsory.
2) Attempt any three out of remaining four questions.
3) Assume any suitable data wherever required but justify the same.

1 a Explain the Need & Effect of scaling. 20

b Find resistance Rn for nMOS if electron mobility μ_n=560cm^2/V-sec, t_{ox}= 10 nm , ε_{0x}= 3.9 x8.85x10^{-14} F/cm , and V_G=3.3 Volts. V_{THn} =0.7 Volts if W=10µm , L=0.5µm

c Explain Latch-up problem in CMOS and how it can be avoided

d Draw the circuit and explain the working for bidirectional pad

2 a Design CMOS inverter such that the switching threshold is V_{th} = 1.2 V, with the following device parameters: 10

NMOS: $V_{T0,n}$= 0.6 V μ_nC_{ox}=60 µA/V^2

PMOS: $V_{T0,p}$= -0.8 V μ_pC_{ox}=20 µA/V^2

Assume V_{DD}= 2.4 V and λ=0

b Derive expression for current in saturation region from that of the linear region current equation also explain the effect of substrate potential (Body Effect) on current and also discuss the effect on overall performance of the device. 10

3 a Explain the effect of scaling on interconnects and comment on performance of VLSI circuit. 10

b Draw the schematic of carry look-ahead adder Explain how speed can be improved? 10

4 a $F = \overline{a \cdot b + c \cdot d \cdot e}$ 10

Consider the logical function as given above

i) Design the CMOS logic gate that provides the function.

ii) Is it possible to find an Euler graph for the circuit? If so, construct the graph and also it to perform stick level layout. If not find a Layout strategy for the GATE.

b For the function $Z = \overline{(A+B)(E+F)(H+I)}$ 10

(i) Domino CMOS circuit (ii) Draw an equivalent circuit for domino circuit by using equivalent transistor sizes with W/L=30/2 (both for NMOS and PMOS)

5 a Explain the Latch-up problem in CMOS with neat diagram also give the different methods to overcome the latch-up. 5

b Compare various loads used in Inverter circuit. Draw proper diagram and compare different parameters which characterize each type of Inverters 10

c Draw the Schematic of 6-transistor SRAM cell also the draw layout for the same 5

6 a Explain the clock generation and different types of clocking schemes for VLSI circuit Explain various issues of clock distribution? Explain how they are addressed? 10

b How the cross-talk in multilayer system is modeled? 5

c Explain Charge sharing problem and give the solution 5

TE-Sem VI EXTC CBSGS 21/11/17

Digital Communication

Q. P. Code: 24894

Duration: 3 Hours

Total Marks : 80

N.B.: (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of remaining five.
(3) All questions carry equal marks.
(4) Assume Suitable data, if required and state it clearly.

QNo.1 Attempt any Four :- 20

a What is matched filter? Mentation two properties of Matched filter.
b State the significance of minimum distance block code.
c Describe how channels can be classified briefly explain each.
d How is spread spectrum signal different from normal signal?
e Explain the following terms in digital modulation techniques: Probability of error, Power spectra, Bandwidth efficiency.

Q No.2 a Explain the Huffman encoding procedure. A discrete memoryless source (DMS) has five symbols with probabilities for its output as described in Table. 10

Symbol	X_1	X_2	X_3	X_4	X_5
Probability	0.4	0.19	0.16	0.15	0.1

Construct a Huffman code for X and calculate the efficiency of the code.

b Why do we need to use the line code formats? State the important properties of line codes. 10

Q No.3 a Sketch PSK and QPSK signals for the input bit sequence 10011010. What are the similarities between them? How do they differ to each other? 10

b A polar NRZ waveform has to be received with the help of a matched filter. Here, binary 1 is represented by a rectangular positive pulse. Also, binary zero is represented by a rectangular negative pulse. Determine the impulse response of the matched filter. Also, sketch it. 10

Q No.4 a Draw the block diagram of binary Frequency shift Keying (BFSK) generation. And also explain the Spectrum of BFSK signal. 10

b The Parity check matrix of particular (7,4) linear block code is given by : 10

$$H = \begin{bmatrix} 1 & 1 & 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

i. Find the generator matrix (G)
ii. List all the codevectors
iii. What is the minimum distance between the code vectors?
iv. How many errors can be detected? How many errors can be corrected?

Q No.5 a For the systematic (7, 4) cyclic code, determine the generator matrix and parity check matrix. Given generator $g(x) = x^3 + x + 1$. 10

b Generator vectors for a rate 1/3 convolutional encoder are: 10
$g^1 = (1,0,1)$, $g^2 = (1,1,0)$, $g^3 = (1,1,1)$

i. Draw encoder diagram.
ii. Draw trellis diagram.

Q No.6

b Explain M-Ary FSK with the help of following. 10
i. Block diagram
ii. Spectrum of M-Ary FSK
iii. Bandwidth of M-Ary FSK

c Explain with block diagram, direct sequence spread spectrum technique. 10

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TE-Sem VI EXTC CBSGS 21/11/17
Digital Communication.

Q. P. Code: 24894

Duration: 3 Hours

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i. Draw encoder diagram.
ii. Draw trellis diagram.

Q No.6

b Explain M-Ary FSK with the help of following. 10
i. Block diagram
ii. Spectrum of M-Ary FSK
iii. Bandwidth of M-Ary FSK

c Explain with block diagram, direct sequence spread spectrum technique. 10

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TE sem VI (CBSGS) ETC
Advanced Instrumentation System

Q. P. Code: 22743

Total Marks: 80 **Time: 3 Hours**

Note: 1) Question No.1 is compulsory.

2) Attempt any three questions from remaining five questions.

3) Assume suitable data if necessary.

4) Figures to the right indicate full marks.

Q.1) Explain in brief

a) Smart transmitter 5M

b) Derivative controller 5M

c) Butterfly valve 5M

d) Data logger 5M

Q.2) a) Give the comparison details of electrical, pneumatic and hydraulic systems. 10M

b) What is proportional control? Explain it in detail. 10M

Q.3) a) Give the details of 2wire, 3wire and 4wire transmitters with suitable diagrams. 10M

b) Explain the terms rangeability and control valve sizing. A velocity control system has a range of 200 to 400 mm/s. If the set point is 325 mm/s and the measured value is 290 mm/s, calculate the error as % of span. 10M

Q.4) a) Give the classification of compressors. Explain any two rotary compressors with diagram. 10M

b) What is Transmitter? Give the classification details of transmitters. Draw and Explain a process loop with transmitter. 10M

Q.5) a) Explain flapper nozzle system. Explain any two applications of flapper nozzle system for industrial use. 10M

b) Explain methods for local pressure control with diagram. 10M

Q.6) a) What is the necessity of the positioner. Draw the diagram for any one valve positioner and give the details. 10M

b) Write short note on 10M

i) Telemetry

ii) Actuator selection parameters

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T.E. (EXTC) CBGS Sem VI

Computer Communication & Telecom Networks

(3)

4/12/17

Q.P. Code: 27200

[03 Hour] **[Total Marks: 80]**

N.B.

i) Question No.1 is compulsory.

ii) Attempt any three from the remaining questions.

Q1. Attempt the following: **[20]**

a) What are the performance parameters of computer network?

b) List the features of WLAN.

c) Explain the concept of connectionless and Connection oriented protocol with example.

d) How MPLS is different from traditional routing

Q2.

a) Compare between bridge and router. **[6]**

b) Draw and explain field of IPv4 datagram. **[8]**

c) Derive the expression of efficiency of ALOHA. **[6]**

Q3.

a) Different between FDM and TDM. **[4]**

b) Explain in detail the physical media used for computer communication. **[8]**

c) Classify multiple-access protocols and explain the CSMA/CD **[8]**

Q4.

a) Classify unicast routing protocol and explain the working principle of RIP. **[8]**

b) How link state routing is advantageous than distance vector routing. **[6]**

c) Discuss the working Principle of HFC **[6]**

Q5.

a) What do you mean by socket? Explain Network Socket Programming. **[7]**

b) How UDP is different from TCP for data transmission? **[7]**

c) What is the role of SMTP in application layer? **[6]**

Q6 .Write a short notes on: **[20]**

a) TCP/IP Overview

b) Network topologies

c) Congestion Control